Amendments to the Claims

Please amend the claims to read as follows.

1-56. (Cancelled)

57. (Previously Presented): A method of acquiring and processing Magnetic Resonance Image (MRI) data from Nuclear Magnetic Resonance signals generated by an object within a magnetic field having a predetermined spatial gradient, for use in reconstructing an image representing said object, the method comprising the steps of:

acquiring a first set of first image data items using a first value of said predetermined spatial gradient for use in constructing a first image of said object;

acquiring a second set of second image data items using a second value of said predetermined spatial gradient which differs from said first value thereof for use in constructing a second image of said object wherein second image data items of said second set are acquired before acquisition of said first set is complete;

generating third image data items according to first image data items, second image data items and the ratio of said different first and second values of said predetermined spatial gradient.

58. (Previously Presented): A method according to Claim 57 wherein said second image data items of said second set acquired before acquisition of said first set is complete are acquired from points in Fourier-Space which coincide with those points in Fourier-Space from which first image data items of said first set are acquired.

59. (Previously Presented): A method according to Claim 58 in which acquiring said first set of first image data items and said second set of second image data items includes the steps of:

     (a)   acquiring first image data items from a selected set of points in Fourier-Space; and

     (b)   acquiring second image data items from said selected set of points in Fourier-Space; and

c) selecting a new set of points in Fourier-Space and repeating steps (a) and (b) in respect of said new selected set of points until acquisition of said first set is complete.

60. (Previously Presented): A method according to Claim 59 in which said selected set of points in steps (a) and (c) each forms a respective line of points in Fourier-Space wherein a set of points selected in step (c) forms a line of points being substantially parallel to a line of points formed by the selected set of points employed in preceding steps (a) and (b).

61. (Previously Presented): A method according to Claim 57 wherein the ratio of said different values of said predetermined spatial gradient is a constant value.

62. (Previously Presented): A method according to Claim 57 wherein the third image data items include pixel values of an image representing said object and are generated such that the position (x_3) of an image pixel in an image constructed according to the third data items is related to the positions (x_1 and x_2) of an image pixel in an image constructed according to the first and second data items respectively via the equation:

$$x_3 = \frac{\alpha x_1 - x_2}{\alpha - 1}$$

where α is the value of said ratio of said different values of said predetermined spatial gradient.

63. (Previously Presented): A method according to Claim 62 wherein pixel intensity values (i_3) of an image pixel at position x_3 in an image constructed according to the third data items is related to the pixel intensity values (i_1 and i_2) of an image pixel in an image constructed according to the first and second data items respectively at positions x_1 and x_2 via the equation:

$$i_3 = (1-\alpha)\frac{i_1 \cdot i_2}{i_1 - \alpha \cdot i_2}$$

where α is the value of said ratio of said different values of said predetermined spatial gradient.

64. (Previously Presented): A method according to claim 57 wherein the ratio of said different values of said predetermined spatial gradient is substantially equal to -1 (minus one).

65. (Previously Presented): A method according to Claim 57 including the steps of:

generating first real-space image data items from said first image data items, and second real-space image data items from said second image data items;

defining a first image boundary corresponding to the periphery of an image feature within the image frame of an image constructed according to said first real-space image data items;

defining a second image boundary corresponding to the periphery of said image feature within the image frame of an image constructed according to said second real-space image data items;

defining a third image boundary according to said first boundary and said second boundary; and,

segmenting said first real-space image data items according to said first image boundary; segmenting said second real-space image data items according to said third image boundary.

66. (Previously Presented): A method according to Claim 65 wherein said first and said second real-space image data items are each segmented such that: data items outside said first and third image boundary are discarded respectively; and, data items inside said first and third image boundary are retained respectively.

67. (Previously Presented): A method according to Claim 65 or Claim 66 wherein the third image boundary is defined according to an average of the difference between the first image boundary and the second image boundary.

68. (Previously Presented): A method according to Claim 67 wherein the third image boundary is defined by one of the first image boundary and the second image boundary modified according to an average of the difference between the first image boundary and the second image boundary.

69. (Previously Presented): A method according to Claim 67 wherein the first image boundary

is defined by a first image boundary vector and the second image boundary is defined by a second image boundary vector and said difference between said first image boundary and said second image boundary is a difference vector being the difference between said first image boundary vector and said second image boundary vector.

70. (Previously Presented): A method according to Claim 69 wherein the third image boundary is defined by a third image boundary vector being one of the first image boundary vector and the second image boundary vector to which is added an averaged-difference vector being an average of said difference vector.

71. (Previously Presented): A method according to Claim 70 wherein the value of each element of said averaged-difference vector is determined as a weighted average of the values of:

a corresponding element of said difference vector; and,

a predetermined number of elements of said difference vector which neighbor said corresponding element.

72. (Previously Presented): A method according to Claim 57 including the steps of:

generating first real-space image data items from said first image data items, and second real-space image data items from said second image data items;

(a) comparing first real-space data items with second real-space data items;

(b) estimating whether or not data items so compared correspond with the same feature of the imaged object; and if not,

c) iteratively repeating steps (a) and (b) in respect of real-space data items at least one of which differs from any of those compared in the previous iteration of step (a).

73. (Previously Presented): A method according to Claim 57 comprising the steps of:

generating first real-space image data items from said first image data items, and second real-space image data items from said second image data items;

(i) selecting a first set of data items from said first real-space image data items;

(ii) selecting a second set of data items from said second real-space image data items;

(iii) comparing data items from said first set with data items from said second set;

(iv) defining a measure of similarity between data items so compared;

(v) estimating according to said measure of similarity whether or not said real-space data items so compared correspond with the same feature of the imaged object; and if not,

(vi) iteratively repeating steps (ii) to (v) in which at least one data item of said first set is compared to a data item of said second set with which it was not compared in the previous iteration of step (iii).

74. (Previously Presented): A method according to Claim 73 wherein said first set and said second set of data items comprises image pixel values corresponding to a group of pixels positioned within an image constructed according to said first and said second real-space image data items respectively whereby the pixel position of each element of the group neighbours the pixel position of another element of the group.

75. (Previously Presented): A method according to Claim 74 in which step (ii) includes selecting a subset of one or more data items from within said second set defining a subgroup of pixel values whereby the pixel position of each element of the subgroup neighbors the pixel position of another element of the subgroup when the subgroup comprises a plurality of elements, and in which step (iii) includes comparing pixel values of the first set with pixel values of the second set in which the pixel position of at least one element of said subset is displaced relative to the pixel position of the same element during the previous iteration of step (iii).

76. (Previously Presented): A method according to Claim 75 in which when the estimation according to step (v) is affirmative steps (ii) to (v) and (vi) are performed in respect only of elements within the subset in respect of which the affirmative estimation according to step (v) was obtained.

77. (Previously Presented): A method according to Claim 75 or 76 wherein each subset comprises a predetermined proportion of the total number of elements from within the set from which they are selected.

78.   (Previously Presented):   A method according to Claim 77 wherein the predetermined proportion is one half (1/2).

79.   (Canceled).

80.   (Withdrawn):   Apparatus for acquiring and processing Magnetic Resonance Image (MRI) data from Nuclear Magnetic Resonance signals generated by an object within a magnetic field having a predetermined spatial gradient, for use in reconstructing an image representing said object, the apparatus comprising:

       image acquisition means for acquiring a first set of first image data items using a first value of said predetermined spatial gradient for use in constructing a first image of said object, and for acquiring a second set of second image data items using a second value of said predetermined spatial gradient which differs from said first value thereof for use in constructing a second image of said object, wherein said image acquisition means is arranged to acquire second image data items of said second set before acquisition of said first set is complete;

       gradient control means for changing the value of said predetermined spatial gradient;

       image processing means for generating third image data items according to first image data items, second image data items and the ratio of said different first and second values of said predetermined spatial gradient.

81.   (Withdrawn):   Apparatus according to Claim 80 wherein said image data acquisition means is arranged to acquire second image data items of said second set before acquisition of said first set is complete from points in Fourier-Space which coincide with those points in Fourier-Space from which first image data items of said first set are acquired.

82.   (Withdrawn):   Apparatus according to Claim 81 in which said image data acquisition means is arranged to acquire said first set of first image data items and said second set of second image data items by:

       (a)   acquiring first image data items from a selected set of points in Fourier-Space; and

       (b)   acquiring second image data items from said selected set of points in Fourier-Space;

and

     c) selecting a new set of points in Fourier-Space and repeating steps (a) and (b) in respect of said new selected set of points until acquisition of said first set is complete.

83. (Withdrawn): Apparatus according to Claim 82 in which said selected set of points in steps (a) and (c) each forms a respective line of points in Fourier-Space wherein a set of points selected in step (c) forms a line of points being substantially parallel to a line of points formed by the selected set of points employed in preceding steps (a) and (b).

84. (Withdrawn): Apparatus according to Claim 80 wherein said gradient control means is arranged to change the value of said predetermined spatial gradient such that the ratio of said different values thereof is a constant value.

85. (Withdrawn): Apparatus according to Claim 80 wherein the third image data items include pixel values of an image representing said object and are generated such that the position (x_3) of an image pixel in an image constructed according to the third data items is related to the positions (x_1 and x_2) of an image pixel in an image constructed according to the first and second data items respectively via the equation:

$$x_3 = \frac{\alpha x_1 - x_2}{\alpha - 1}$$

where α is the value of said ratio of said different values of said predetermined spatial gradient.

86. (Withdrawn): Apparatus according to claim 85 wherein pixel intensity values (i_3) of an image pixel at position x_3 in an image constructed according to the third data items is related to the pixel intensity values (i_1 and i_2) of an image pixel in an image constructed according to the first and second data items respectively at positions x_1 and x_2 via the equation:

$$i_3 = (1 - \alpha) \frac{i_1 \cdot i_2}{i_1 - \alpha \cdot i_2}$$

where α is the value of said ratio of said different values of said predetermined spatial gradient.

87. (Withdrawn): Apparatus according to Claim 80 wherein the ratio of said different values of said predetermined spatial gradient is substantially equal to −1 (minus one).

88. (Withdrawn): Apparatus according to Claim 80 wherein said image processing means is arranged to:

generate first real-space image data items from said first image data items, and second real-space image data items from said second image data items;

define a first image boundary corresponding to the periphery of a feature within the image frame of an image constructed according to said first real-space image data items;

define a second image boundary corresponding to the periphery of said feature within the image frame of an image constructed according to said second real-space image data items;

define a third image boundary according to said first boundary and said second boundary;

segment said first real-space image data items according to said first image boundary;

segment said second real-space image data items according to said third image boundary.

89. (Withdrawn): Apparatus according to claim 88 wherein said image processing means is arranged to segment each of said first and said second real-space image data items such that: data items outside said first and third image boundary are discarded respectively; and, data items inside said first and third image boundary are retained respectively.

90. (Withdrawn): Apparatus according to any of Claims 88 to 89 wherein the third image boundary is defined according to an average of the difference between the first image boundary and the second image boundary.

91. (Withdrawn): Apparatus according to Claim 90 wherein the third image boundary is defined by one of the first image boundary and the second image boundary modified according to an average of the difference between the first image boundary and the second image boundary.

92. (Withdrawn): Apparatus according to Claim 90 wherein the first image boundary is defined by a first image boundary vector and the second image boundary is defined by a second image boundary vector and said difference between said first image boundary and said second image boundary is a difference vector being the difference between said first image boundary vector and said second image boundary vector.

93. (Withdrawn): Apparatus according to Claim 92 wherein the third image boundary is defined by a third image boundary vector being one of the first image boundary vector and the second image boundary vector to which is added an averaged-difference vector being an average of said difference vector.

94. (Withdrawn): Apparatus according to Claim 93 wherein the value of each element of said averaged-difference vector is determined as a weighted average of the values of:

a corresponding element of said difference vector; and,

a predetermined number of elements of said difference vector which neighbor said corresponding element.

95. (Withdrawn): Apparatus according to Claim 80 wherein the image processing means is arranged to perform the steps of:

generating first real-space image data items from said first image data items, and second real-space image data items from said second image data items;

(a) comparing first real-space data items with second real-space data items;

(b) estimating whether or not data items so compared correspond with the same feature of the imaged object; and if not,

(c) iteratively repeating steps (a) and (b) in respect of real-space data items at least one of which differs from any of those compared in the previous iteration of step (a).

96. (Withdrawn): Apparatus according to Claim 80 wherein the image processing means is arranged to perform the steps of:

generating first real-space image data items from said first image data items, and second

real-space image data items from said second image data items;

      (i) selecting a first set of data items from said first real-space image data items;

      (ii) selecting a second set of data items from said second real-space image data items;

      (iii) comparing data items from said first set with data items from said second set;

      (iv) defining a measure of similarity between data items so compared;

      (v) estimating according to said measure of similarity whether or not said real-space data items so compared correspond with the same feature of the imaged object; and if not,

      (vi) iteratively repeating steps (ii) to (v) in which at least one data item of said first set is compared to a data item of said second set with which it was not compared in the previous iteration of step (iii).

97. (Withdrawn): Apparatus according to Claim 96 wherein said first set and said second set of data items comprises image pixel values corresponding to a group of pixels positioned within an image constructed according to said first and said second real-space image data items respectively whereby the pixel position of each element of the group neighbors the pixel position of another element of the group.

98. (Withdrawn): Apparatus according to Claim 97 in which step (ii) includes selecting a subset of one or more data items from within said second set defining a subgroup of pixel values whereby the pixel position of each element of the subgroup neighbours the pixel position of another element of the subgroup when the subgroup comprises a plurality of elements, and in which step (iii) includes comparing pixel values of the first set with pixel values of the second set in which the pixel position of at least one element of said subset is displaced relative to the pixel position of the same element during the previous iteration of step (iii).

99. (Withdrawn): Apparatus according to Claim 98 in which when the estimation according to step (v) is affirmative steps (ii) to (v) and (vi) are performed in respect only of elements within the subset in respect of which the affirmative estimation according to step (v) was obtained.

100. (Withdrawn): Apparatus according to Claim 98 or 99 wherein each subset comprises a

predetermined proportion of the total number of elements from within the set from which they are selected.

101. (Withdrawn): Apparatus according to Claim 100 wherein the predetermined proportion is one half.

102. (Withdrawn): Apparatus for reconstructing nuclear Magnetic Resonance images (MRI) or other images using the apparatus of Claim 80.

103. (Withdrawn): A computer system for use in image reconstruction according to the method of Claim 57.

104. (Withdrawn): The use of a computer system for image acquisition and processing according to the method of Claim 57.

105. (Withdrawn): A program for a computer comprising computer code which when executed on a computer system implements a method of Claim 57 using acquired image data.

106. (Withdrawn): A computer program product storing a program for a computer according to Claim 105.

107. (Withdrawn): An image generated using the method of Claim 57 or using any of the apparatus of Claim 80.

108. (Withdrawn): A Nuclear Magnetic Resonance Imaging system comprising apparatus according to Claim 80.

109. (Withdrawn): An image generated using the nuclear Magnetic Resonance Imaging system according to Claim 108.

110. (Withdrawn): An image generated using the computer system, or computer program or computer program product according to Claim 103, Claim 105 or Claim 106.